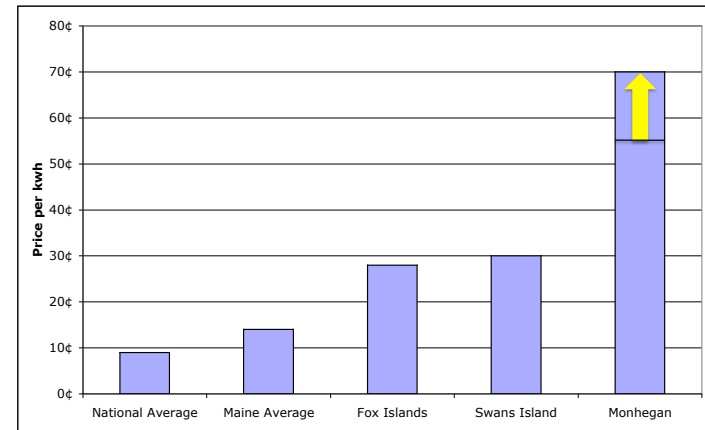


Wind Powering the Islands

George Baker
Harvard University
Island Institute
September 13, 2008

Retail Electric Prices



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Situation facing the islands

- Power costs extremely high
 - And rising...
- The cost of maintaining the existing infrastructure is very high
- There is an excellent wind resource
 - Cost of wind power is around 5¢ per kWh
 - Island construction costs are high, but...
 - Low cost financing is available

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\$20 bill on the sidewalk?

- Is it possible to use the wind resource to meet the islands electric (and other energy) needs?
- What will it take to bend down and pick up this \$20 bill?

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Fox Islands Wind Power Project

- Fox Islands Electric Coop
 - Vinalhaven and North Haven
 - 2000 members
 - 28¢ per kwh for electricity
 - 11 mile submarine cable to the mainland
- Wind study done 2002-2005
 - Good wind resource
- Community very interested in the possibility of renewable energy

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Economic Feasibility

- Size the project to generate what the islands use
 - Not truly self-sufficient
 - Still have to buy 40% of needs
 - Avoid buying 60%
 - Sell the excess
- Renewable energy credits

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Promising Economics

- Generates over \$1,000,000 in economic benefit
 - Avoided power costs
 - Power sales
 - RECs
- Capital costs: \$10M - \$13M

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Financing the Project

- Tax credit investors
 - Federal tax credits
- Pre-selling the RECs
- Rural Utilities Service loan
 - 20-year loan at 4.3% interest
- Possible grants and foundation support

Cost of electricity: under 4¢ per kwh

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Environmental Impact

- Avian studies
 - Spring migration
 - Summer nesting and breeding
 - Fall migration
 - Bats
- Sound impact
- Visual impact

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What can we do on Monhegan?

- Cost of electricity is twice as high!
- Wind resource is substantially better

\$100 bill on the sidewalk?

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But there is a problem...

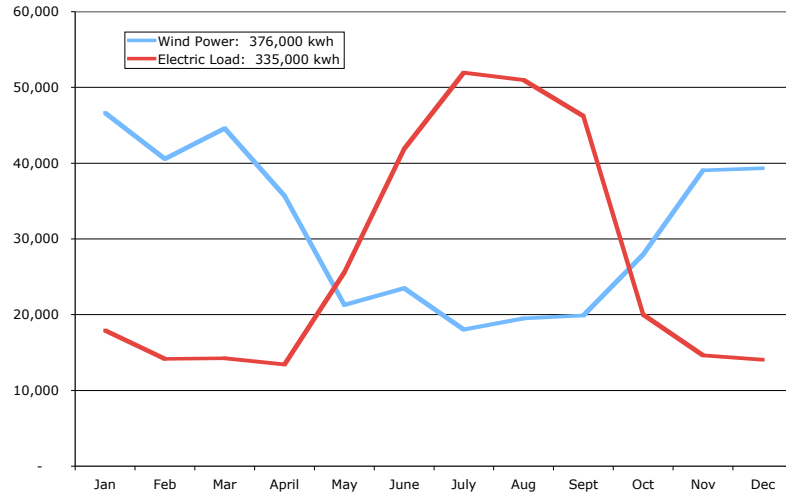
- Mohegan has no connection to the grid
- The wind does not blow when the island needs electricity

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Monhegan 2007: 100kw Turbine



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Sizing the wind turbine

- If you put up a turbine that generated as much power as you use during the year, you would displace 50% of the fuel oil burned in a year
- And you would have to dump 50% of the power generated by the wind
- At current fuel oil prices, it still might be possible to make this economically viable
 - At generating costs of 40¢ per kwh...

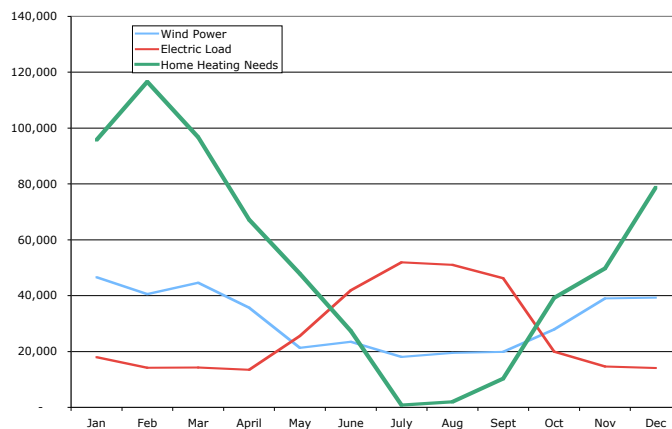
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What to do with this excess energy?

Monhegan 2007



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Using Wind Power for Heating

- Need what is called a “dispatchable dump load”
- How to heat homes with electricity when the wind is blowing, but not when it is not
- Want to avoid major new investment in heating systems

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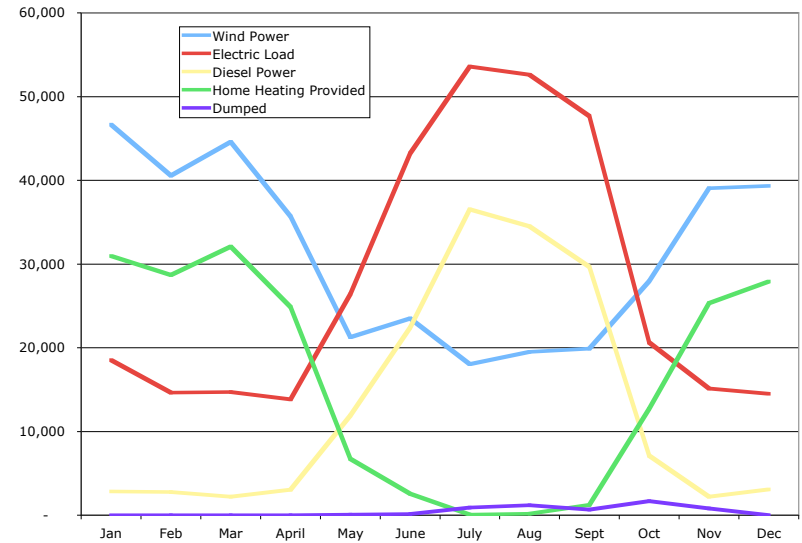
Simple Technology

- Oil-filled electric radiators
 - Available at Walmart for \$50
 - Most household wiring can handle a few of these without major upgrades
- Utility-controlled switching module
 - Activated by a signal sent by the electric company
 - Only use electric heat when the wind turbine is generating excess energy

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What are the savings?

Model using a 100kw wind turbine

Total annual output: 376,000 kwh
 Island annual load: 335,000 kwh
 Displaced #2 fuel oil use
 Reduction in generation: 170,000 kwh
 Reduction in #2 fuel oil: 17,000 gallons
 Savings: \$53,000 - \$68,000

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What are the savings?

Total heating use: 650,000 kwh
 Annual cost of propane: \$120,000
 Reduction from wind: 30%
 Propane savings: \$36,000

Total savings: \$80,000 - \$105,000

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One other (far-fetched?) idea...

- A larger wind facility would generate significantly more power
- Could reduce #2 fuel oil, as well as propane use, even more
- Could use excess to make hydrogen, which could be used to power the lobster fleet

Cost and Financing

- Total cost of turbine, control equipment, and construction: \$500,000 - \$1M
- Investment by an interested individual or company?
- Rural Utilities Service loan?
- Grants and foundations

Next Steps...

- Whether to proceed with further exploration depends entirely on the community's wishes
- Costs
 - Risk
 - Environmental
- Benefits
 - Reduced energy costs
 - Reduced energy cost uncertainty
 - Using an available resource of the community